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Yukihiko Minamida

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EDWARDS ANGELL PALMER & DODGE LLP

P.O. BOX 55874

BOSTON, MA 02205

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The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* YUKIHIKO MINAMIDA,  
MASAYOSHI IMANAKA,  
and KOJIRO TANAKA

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Appeal 2008-4950  
Application 10/668,964  
Technology Center 1700

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Decided:<sup>1</sup> February 24, 2009

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Before EDWARD C. KIMLIN, KAREN M. HASTINGS, and  
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

Appellants appeal under 35 U.S.C. § 134 the final rejection of claims 1-4. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

## INTRODUCTION

Appellants claim a solvent-free moisture-curable hot melt urethane resin composition (claim 1). The Specification discloses that the composition is excellent in viscosity stability in a state of being heat-melted for a long time, and also excellent in crosslinking reactivity with moisture (Spec. 1).

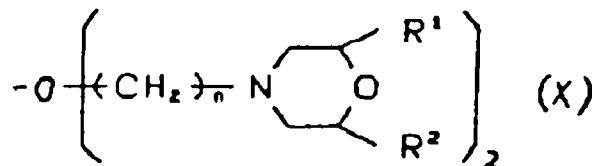
Claim 1 is illustrative:

1. A solvent-free moisture-curable hot melt urethane resin composition comprising:

an isocyanate group-containing hot melt urethane prepolymer (A) prepared by reacting a polyisocyanate with a polyester polyol which comprises a condensate of a polyhydric alcohol and a polybasic acid,

wherein the polybasic acid is selected from the group consisting of a phthalic acid, an isophthalic acid, a terephthalic acid, and a mixture thereof;

a crosslinking catalyst (B) of general formula (X):



wherein R<sup>1</sup> and R<sup>2</sup> represent a hydrogen or an alkyl group and n represents a positive integer; and

at least one sulfur atom-containing organic acid (C) selected from the group consisting of sulfonic acids and sulfinic acids.

The Examiner relies on the following prior art references as evidence of unpatentability:

Von Bonin <sup>2</sup>	US 4,411,262	Oct. 25, 1983
Lee	US 4,574,793	Mar. 11, 1986
Helmeke	US 6,844,073 B1	Jan. 18, 2005

Oertel, *Polyurethane Handbook: Chemistry-Raw Materials-Processing-Applications-Properties*, Hanser Publishers, New York, 96-97 (1985).

The appealed rejections are as follows:

1. Claims 1-4 are rejected under 35 U.S.C. § 103 as being unpatentable over Helmeke in view of Oertel, or Helmeke in view of Lee and Von Bonin.

Appellants argue the claims as a group. Pursuant to 37 C.F.R. § 41.37, we select claim 1 as the representative claim on which to render our Decision.

The Examiner finds that Helmeke discloses all the features recited in claim 1, except for the addition of sulfonic acid (Ans. 3-4). The Examiner finds that Oertel or Lee discloses using sulfonic acids in a moisture curable polyurethane adhesive as inhibitors for isocyanate reactions (Ans. 4). Based on these disclosures, the Examiner concludes that it would have been obvious to combine sulfonic acids as taught by Oertel or Lee with

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<sup>2</sup> The Examiner added Von Bonin to the statement of the rejection in the Answer (Ans. 3). The Examiner stated that including Von Bonin in the statement of the rejection did not constitute a new ground of rejection because it was referenced within the body of the rejection in previous office actions (Ans. 3). Appellants do not contest the addition of Von Bonin to the statement of the rejection. Accordingly, we determine that the Examiner's inadvertent omission of Von Bonin from the statement of the rejection is harmless error.

Helmeke's polyurethane adhesive composition to control the "open time" of Helmeke's adhesive (Ans. 4).

Appellants argue that Helmeke's disclosure regarding "open time" of the adhesive provides no motivation to combine the references to incorporate the sulfonic acid teachings of Lee or Oertel with Helmeke (Reply Br. 3). Appellants further contend that Oertel inhibits the reaction during preparation of the prepolymer, not the curing reaction after preparation of the prepolymer, such that there would have been no reason to combine Oertel's sulfonic acid inhibitor with Helmeke (Reply Br. 3-4).

Regarding Lee, Appellants contend that Lee's reference to the Von Bonin patent, which discloses prepolymers containing an aromatic ring and non-aromatic ring, would not have motivated one of ordinary skill in the art to select Von Bonin's aromatic ring containing prepolymers for use with Lee's sulfonic acid containing adhesive composition and Helmeke's adhesive composition (Reply Br. 4-5)

Appellants further argue that the § 132 Declaration filed April 13, 2005 (hereinafter Declaration I), and the § 132 Declaration filed February 27, 2006 (hereinafter Declaration II), establish that the claimed composition produces unexpected results with regard to thermal stability melt viscosity over time and creep resistance (App. Br. 15-21; Reply Br. 5-10). Specifically, Appellants contend that the data in Declaration II is commensurate in scope with the claimed invention, compared to the closest prior art (i.e., Helmeke), and the results are unexpected (App. Br. 15-21; Reply Br. 5-10).

## ISSUES

Based upon Appellants' arguments and the Examiner's contentions, the issues presented are:

1. Did Appellants show that the Examiner reversibly erred in determining that there would have been a reason to combine the disclosure to use sulfonic acids of Oertel or of Lee in view Von Bonin with Helmeke's adhesive composition? We answer this question in the negative.
2. Did Appellants establish that the data contained in Declarations I and II demonstrate unexpected results in the claimed invention so as to rebut any prima facie case of obviousness? We answer this question in the negative.

## PRINCIPLES OF LAW

The test for obviousness is what the combined teachings of the prior art would have suggested to one of ordinary skill in the art. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). "[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007).

When analyzing the obviousness of a claimed invention, a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *KSR*, 127 S. Ct. at 1740.

Appellants have the burden of explaining the data in any declaration proffered as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (BPAI 1992) citing *In re Payne*, 606 F.2d 303 (CCPA 1979); *In re Borkowski*, 505 F.2d 713 (CCPA 1974); *In re Goldberg*, 168 F.2d 527

(CCPA 1948). Evidence of nonobviousness must be compared with the closest prior art. *In re Burckel*, 592 F.2d 1175, 1179-80 (CCPA 1979). Any showing of unexpected results must be commensurate in scope with the claimed range. *In re Peterson*, 315 F.3d 1325, 1329-31 (Fed. Cir. 2003).

#### FACTUAL FINDINGS (FF)

1. Appellants' Specification states in the "Background of the Invention" section that hot melt adhesive compositions are conventionally made using diphenylmethane diisocyanates (an aromatic polyisocyanate) because of its crosslinking reactivity and safety (Spec. 2).
2. The Specification further states that the diphenylmethane diisocyanates may react with the urethane bond in the prepolymer itself to form an allophanate bond because of its high reactivity and thus increase the molecular weight and viscosity of the system (Spec. 2-3).
3. The Specification further states that the increase in molecular weight may occur upon melting of the hot melt resin, which may cause thickening over time and affect wettability of the substrate or gelling of the resin (Spec. 3).
4. The Specification states that studies have been conducted on suppressing the increase in molecular weight associated with the side reaction (i.e., the urethane reaction) during melting of the reactive hot melt resin (Spec. 3).
5. Helmeke discloses a hot melt moisture cure polyurethane adhesive composition that exhibits wide open time range with good green strength (col. 1, ll. 7-10).

6. Helmeke discloses that “open time” relates to the flow or hardness of the adhesive. During “open time” the adhesive is capable of flowing and wetting-out the surface of the substrate (col. 2, ll. 11-16).
7. Appellants do not contest any of the Examiner’s findings regarding Helmeke’s disclosure (App. Br. 9-11).
8. Lee discloses “curable polyurethane systems, which are generally comprised of polyurethane prepolymer, a catalyst, and a stabilizer for the system (col. 1, ll. 8-10).
9. Lee discloses that the stabilizer is introduced “to prevent the catalyst from auto-catalyzing alternative reactions to the polyurethane polymerization”, such as the well-known allophanate reaction for urethane systems (col. 1, ll. 43-46).
10. Lee uses methane sulfonic acid as a stabilizer to prevent the alternative reactions (col. 2, ll. 45-61).
11. Lee further discloses that the methane sulfonic acid stabilizer may be added to “virtually any polyurethane prepolymer system wherein shelf life or extended stability is desirable” (col. 3, ll. 31-33).
12. Lee discloses that the suitable prepolymers useful with the systems are disclosed by “U.S. Pat. No. 4,411,262” (i.e., Von Bonin) (col. 4, ll. 47-49).
13. Lee states:

The invention herein has been disclosed with reference to particular chemical systems, products and materials. In particular, the *universally applicable stabilizer of the invention, methane sulfonic acid* has been identified in particular catalyzed, prepolymer systems. *These systems should not be taken to be limiting, and the stabilizer has utility in polyurethane systems in general.* Accordingly, variations of the specific examples set forth herein will occur



to those of ordinary skill in the art without exercise of inventive faculty.

(Lee, col. 7, ll. 20-29; emphasis added).

14. Von Bonin discloses examples of suitable prepolymers include polyesters with hydroxyl groups formed by reacting polyhydric alcohols and polybasic acids, which include phthalic acid or isophthalic acid, among other polybasic acids (col. 3, ll. 18-34; col. 4, ll. 35-68).
15. Oertel discloses that p-toluene sulfonic acid is a known inhibitor to the isocyanate-reaction (96).
16. In Declaration I only “Comparative Example 3” and “Example” use an aromatic polyester polyol made by “using an isophthalic acid and terephthalic acid” (i.e., Dynacoll 7130), two of the polybasic acids recited in claim 1 (Dec. I, 4-5).
17. Appellants have not explained which of the other Declaration I examples use polybasic acids that are selected from the group consisting of “a phthalic acid, an isophthalic acid, or a terephthalic acid” (Dec. I, 2-7). Appellants have not stated that an isophthalic acid, a terephthalic acid or a phthalic acid would each behave similarly to one another.
18. Though claim 1 recites that the crosslinking catalyst (B) has the general formula shown in claim 1 above, the Declaration I examples use a single catalyst (i.e., U-CAT660M), 2, 2’-dimorpholine diethyl ether (Dec. I, 2-7).
19. A comparison of Example 1 and Comparative Example 3 of Declaration I, the only examples that use hot-melt urethane

- prepolymers made using polybasic acids recited in claim 1 and the comparison closest to Helmeke, the closest prior art, reveals that the Thermal Stability Melt Viscosity of the sample with a sulfonic acid inhibitor (Example 1) slowed the increase in viscosity when compared to the same composition without the sulfonic acid inhibitor (Comparative Example 3) (Dec. I, 8). In other words, the sulfonic acid inhibitor performed the expected art recognized disclosed function of slowing the catalyzed side reactions to slow the thickening process.
20. Analysis of the Creep Resistance data provided for Example 1 and Comparative Example 3 reveals that both exhibited similar properties with regard to Creep Resistance. In other words, the addition of the sulfonic acid did not appear to produce unexpected synergistic results from the data (Dec. I, 8).
21. Though claim 1 recites that the crosslinking catalyst (B) has the general formula shown in claim 1 above and the polyester polyol may be made from three different polybasic acids, all the examples contained in Declaration II contain “Neopentyl glycol terephthalate diol” as the polyester polyol (i.e., based on terephthalic acid as the polybasic acid) and a single catalyst (i.e., U-CAT2041) (Dec. II, 3).
22. As indicated by the Examiner (Ans. 8), the most relevant comparison provided in Declaration II is the comparison of “Comparative Example 1” and “Example 1” because “Comparative Example 1” represents the closest prior art, Helmeke (i.e., a hot-melt moisture curable composition having a catalyst but not sulfonic acid) (Dec. II, 4).

23. As with Declaration I, analysis of “Comparison (1)” in Declaration II reveals that the affect of the sulfonic acid on the Thermal Stability Melt Viscosity is simply the expected result of slowing side reactions that increase the molecular weight and thus the viscosity (Dec. II, 4).
24. Analysis of the Creep Resistance data provided in “Comparison (1)” reveals that both exhibited similar properties with regard to Creep Resistance. In other words, the addition of the sulfonic acid to a composition containing a claimed catalyst and hot-melt urethane prepolymer did not appear to produce unexpected synergistic results from the data (Dec. II, 4).

#### ANALYSIS

##### *Issue 1: Motivation*

Contrary to Appellants' motivation argument, we determine that the teachings of the references, as a whole, would have suggested combining the sulfonic acid stabilizer of Lee in view of Von Bonin, or Oertel with Helmeke's moisture-curable polyurethane system. Specifically, Helmeke discloses that “open time” of the adhesive relates to the adhesive's ability to wet the surface of a substrate and flow (FF 6). Appellants do not dispute the Examiner's finding that Helmeke discloses all the features of claim 1, except for the sulfonic acid (FF 7).

Lee discloses that a methane sulfonic acid stabilizer is used in any polyurethane system to control the side reactions of the catalyst with the urethane and, thus, prevent allophanate bonds from forming (FF 8-13). Lee refers to the Von Bonin disclosure for suitable prepolymers that may be used with the methane sulfonic acid system. Von Bonin discloses that the

prepolymers may include polyesters formed by reacting polyhydric alcohols and polybasic acids, such as phthalic acid or isophthalic acid, for example.

Oertel discloses that the using p-toluene sulfonic acid as an inhibitor in a polyurethane systems (FF 15).

Based on these disclosures, we agree with the Examiner's conclusion that it would have been obvious to combine the sulfonic acid inhibitor of Lee in view of Von Bonin, or Oertel with Helmeke to control the "open time" of the adhesive. Appellants admit that it is known that undesirable side reactions of the hot-melt isocyanate form allophanate bonds, for example, that cause an increase in molecular weight of the hot-melt that affects the ability of the hot-melt to wet the substrate (FF 1-4). Accordingly, based on this record, it would have been obvious to use a known stabilizer, sulfonic acid, as disclosed by Lee in view of Von Bonin or Oertel, that controls the side reactions that form allophanate bonds and affect wettability of the adhesive with Helmeke's polyurethane system. Such an addition would control the allophanate side reactions and aid in producing the desired "open time" (i.e., the time the adhesive has to wet the substrate).

Furthermore, we add that using Lee's or Oertel's sulfonic acid inhibitor would have been merely the predictable use of a prior art element (i.e., sulfonic acid inhibitors) for its intended purpose (i.e., controlling undesirable side reactions in the polyurethane system to stabilize the adhesive).

Appellants contend that there is no reason to combine Helmeke, Lee, or Oertel because none of them teaches or suggests "open time" (Reply Br. 2-3). Appellants improperly focus on the individual teachings of the references. Instead, when properly looking at the teachings of the references

as a whole, we agree with the Examiner that the teachings of the art would have suggested the combination to control the side reactions as noted above.

Appellants' argument that Oertel is directed to inhibiting reaction in preparing the prepolymers, not the curing reaction, such that there is no prima facie case of obviousness (Reply Br. 3-4) is not well taken.

Appellants' Background of the Invention section of the Specification indicates that the hot-melt urethane prepolymer, when melted, may undesirably increase in molecular weight due to side reactions (e.g., allophanate bonds), which also occur when forming the prepolymer (FF 1-4). Accordingly, it appears from the record before us that it was known that the same or similar side reactions occur when the hot-melt urethane prepolymer is melted as when the prepolymer is formed. Under such circumstances, the use of a known inhibitor (e.g., Oertel's sulfonic acids) to control such undesirable side reactions with Helmeke's hot melt adhesive would have been obvious.

For the above reasons, we determine that the Examiner has provided a reason for combining the sulfonic acid of Lee in view of Von Bonin, or Oertel with Helmeke's moisture-curable hot melt adhesive composition such that a prima facie case of obviousness has been established.

*Issue 2: Unexpected Results*

Appellants attempt to rebut the Examiner's prima facie case of obviousness by showing unexpected synergistic results based on the combination of the three components of claim 1. However, Appellants' evidence provided in Declarations I and II does not rebut the prima facie case for the reasons below.

First, the data provided in Declarations I and II does not establish unexpected synergistic results. Specifically, Lee and Oertel recognize that sulfonic acids inhibit undesirable side reactions in prepolymers. Additionally, Appellants' Specification states that it was known that undesirable side reactions, including an increase in molecular weight that thickens the prepolymer, occur when forming the prepolymer and after melting a hot-melt urethane prepolymer (FF 1-4). In other words, the data provided merely evinces that adding an art recognized sulfonic acid inhibitor performs the expected function of preventing undesirable side reactions in the urethane prepolymer and thereby controlling(stabilizing) the melt viscosity.

Second, Appellants have not shown unexpected results over the entire polybasic acid or catalyst claimed ranges. Indeed, Appellants' only data in Declarations I and II include, at most, two of the claimed polybasic acids. Specifically, Declaration I only includes examples showing isophthalic acid and terephthalic acid and Declaration II only includes polyester polyol based on terephthalic acid. Appellants do not appear to have demonstrated use of a phthalic acid. Notably, Appellants have not explained how the data includes all three claimed basic acids.

Similarly, Appellants' Declarations I and II only include two species of catalyst included in the claimed general catalyst formula. Again, Appellants have not explained how these two species of catalyst demonstrate unexpected synergistic results for all the catalysts represented by the claimed general formula.

Instead, Appellants argue that pursuant to the Board's decision in *Ex parte Winters*, 11 USPQ2d 1387 (BPAI 1992), Appellants only need to

show unexpected results for representative compounds (Reply Br. 5). However, Appellants' argument is not persuasive for at least two reasons. First, *Winters* was not a precedential decision by the Board and, thus, we are not bound by its holding. Second and more importantly, the facts in *Winters* are distinct from those present in this appeal. The Board in *Winters* noted that what constitutes "representative" compounds is a factual question decided on a case-by-case basis.

Significantly, the present appeal includes a general formula for the catalyst that includes a multitude of catalysts with R groups that contain hydrogen or "an alkyl group" without the size of the alkyl group specified. In contrast, the compound in *Winters* included five different R groups where each R group was specified to be a particular substituent, or an alkyl group of a particular size (e.g., "a C<sub>4</sub> alkyl group"). In other words, the possible species for the general formula were more constrained in *Winters* than the presently claimed catalyst general formula.

Regarding the polybasic acids, Appellants have not indicated that a phthalic acid would behave in a similar manner as an isophthalic acid or a terephthalic acid (FF 17). Accordingly, we do not find that Appellants' evidence is commensurate in scope with the claimed invention.

Finally, Appellants' evidence in Declarations I and II includes data that is not compared with the closest prior art (i.e., Helmeke). Helmeke discloses using a morpholine catalyst and a hot-melt urethane prepolymer. Accordingly, Appellants' evidence of unexpected results must be compared to these disclosures. Appellants have provided "Comparison (1)" in Declaration II and "Comparative Example 3" and "Example 1" in Declaration I that appear to be on point. However, the other data provided

in the Declarations I and II does not appear to be relevant to this required comparison.

Appellants argue that they only need to compare the evidence in Helmeke's examples, not disclosure, with the claimed invention (Reply Br. 9-10). However, we do not agree. Rather, the correct comparison, as indicated by Appellants is with the closest prior art embodiment (Reply Br. 10). Embodiments in a patent may be disclosed but not exemplified. Accordingly, the relevant comparison in this appeal is with Helmeke's closest embodiment that uses a morpholine catalyst, whether or not contained in an example.

Based on these findings, we determine that the evidence provided by Appellants does not establish unexpected synergistic results due to the claimed composition. Therefore, based on this record, the Examiner has established a prima facie case of obviousness over the combined teachings of Helmeke in view of Oertel, or Lee and Von Bonin, which has not been persuasively rebutted by Appellants.

#### DECISION

We affirm the Examiner's § 103 rejections of claims 1-4 over Helmeke in view of Lee and Von Bonin or Helmeke in view of Oertel.

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

#### ORDER

#### AFFIRMED

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Appeal 2008-4950  
Application 10/668,964

EDWARDS ANGELL PALMER & DODGE, LLP  
P O BOX 55874  
BOSTON MA 02205